

What is claimed is:

1 1. A process for injection molding a hollow plastic tubular
2 article comprising the steps of:

3 (a) injecting a quantity of plastic material into a mold cavity
4 to at least substantially fill said mold cavity, the mold cavity having a
5 substantially cone-shaped inlet portion, an elongated central portion and an exit
6 portion;

7 (b) injecting pressurized gas into the plastic material in the
8 mold cavity;

9 (c) holding the pressure of the gas and plastic in the mold
10 cavity for a predetermined amount of time; and

11 (d) allowing a portion of the plastic material in the mold
12 cavity to be expelled into at least one secondary cavity coupled to the mold
13 cavity.

1 2. The process as set forth in claim 1 further comprising the
2 steps of:

3 (c) permitting the plastic material to solidify;

4 (f) exhausting the gas from the mold cavity; and

5 (g) removing the plastic article from the mold.

1 3. The process as set forth in claim 1 wherein said cone-
2 shaped portion has an apex and said gas is injected into the plastic material at
3 said apex.

1 4. The process as set forth in claim 1 further comprising the
2 step of holding constant the plastic material injection pressure in the mold
3 cavity for a predetermined period of time prior to the injection of gas into the
4 plastic material.

1 5. The process as set forth in claim 1 wherein said plastic
2 material is injected into the mold cavity from an injection molding machine
3 with a barrel and nozzle, said method further comprising the step of allowing a

4 portion of the plastic material in the mold to be expelled back into the barrel of
5 the injection molding machine.

1 6. The process as set forth in claim 1 wherein said exit
2 portion comprises a second substantially cone-shaped portion, said cone-shaped
3 exit portion having an apex and said expulsion of plastic material from the mold
4 cavity into the secondary cavity occurs through said apex.

1 7. The process as set forth in claim 1 further calculating the
2 volume of said at least one secondary cavity in order to allow expulsion of a
3 predetermined amount of plastic material from the mold cavity.

1 8. The process as set forth in claim 1 wherein the step of
2 allowing a portion of the plastic material in the mold to be expelled comprises
3 opening a valve member in a conduit connecting the mold cavity with the
4 secondary cavity.

1 9. The process as set forth in claim 1 wherein the plastic
2 material is injected into the mold cavity at said cone-shaped inlet portion and
3 enters the mold cavity along the outer surfaces thereof.

1 10. The process as set forth in claim 9 further comprising a
2 ring gate mechanism for injecting the plastic material into said cone-shaped
3 inlet portion.

1 11. A process for injection molding a hollow plastic tubular
2 article comprising the steps of:

3 (a) injecting a quantity of plastic material to fill or
4 substantially fill a mold cavity, the mold cavity having a first substantially cone-
5 shaped inlet portion, an elongated central portion and an exit portion;

6 (b) injecting pressurized gas into the plastic material in the
7 mold cavity;

8 (c) holding the pressure of the gas and plastic in the mold
9 cavity for a predetermined amount of time;

1 17. The process as set forth in claim 11 wherein the step of
2 allowing a portion of the plastic material in the mold to be expelled comprises
3 opening a valve member in a conduit connecting the mold cavity with the
4 secondary cavity.

1 18. A process for injection molding a hollow tubular plastic
2 article utilizing an injection molding machine with a barrel and nozzle and a
3 mold with a mold cavity therein, the mold cavity having a substantially cone-
4 shaped inlet portion, an elongated central portion and an exit portion, said
5 method comprising the steps of:

6 (a) injecting a quantity of plastic material into said cone-
7 shaped inlet portion of the mold cavity from the injection molding machine;

8 (b) injecting pressurized gas into the plastic material in the
9 mold cavity; and

10 (c) allowing a first portion of the plastic material in the mold
11 cavity to be expelled back into the barrel of the injection molding machine.

1 19. The process as set forth in claim 18 further comprising
2 the step of holding the constant pressure of the gas and plastic material in the
3 mold cavity for a predetermined amount of time before said first portion of the
4 plastic material is expelled back into the injection molding machine.

1 20. The process as set forth in claim 18 wherein a
2 predetermined amount of plastic material is expelled back into the injection
3 molding machine.

1 21. The process as set forth in claim 18 wherein the gas is
2 injected into the plastic material from said exit portion.

1 22. The process as set forth in claim 18 wherein the plastic
2 material is injected into the mold cavity at said cone-shaped inlet portion and
3 enters the mold cavity along the outer surfaces thereof.

1 23. The process as set forth in claim 22 further comprising a
2 ring gate mechanism for injecting the plastic material into said cone-shaped
3 inlet portion.

1 24. The process as set forth in claim 18 wherein the step of
2 allowing a first portion of the plastic material in the mold to be expelled back
3 into the barrel of the injection molding machine comprises opening a shut-off
4 valve member positioned between said mold cavity and said barrel.

1 25. The process as set forth in claim 24 wherein said valve
2 member is included as part of the nozzle.